

Climate Connections – Background information

How does the temperature affect the melting rate of a glacier?

Background:

Many scientists believe that the temperature of the Earth is changing. Why is that important? The atmosphere helps balance the Earth's temperature and maintain conditions that humans and living things can survive in. If that balance is upset, there can be many different effects on the Earth that we must account for, such as melting glaciers and their effect on sea level, water temperature, and other factors.

Introduction:

Have you ever been curious to know how glaciers melt? How fast can warmer temperatures melt glaciers? How does the surrounding environment, i.e., land, water, air, aid in the rate of glacial melting? Data from satellites orbiting the earth and aerial photographs have shown that even a small rise in temperature, just 1° above normal, have caused great glacial surface melt. In some cases the permafrost is disappearing and being replaced with marshland and/or open water. Glaciers can occur on land (glacial ice field) and in water, in whole form (a glacier), and in partial form (calved glacial ice). The following is a mini- model-scale simulation for the classroom.

Hypothesis:

Students should write what they think will happen after they do some research on glaciers and before they begin this activity. Students should explain why they think the way they do.

Equipment:

- ice cube tray
- cups (for freezing)
- water
- food coloring
- measuring cup
- bowl, small
- 9 x 13 " brownie pan
- timer/clock
- thermometer
- scale in grams – *optional*

Procedure:

- Get 2 cups. Fill each cup with 1 C of water.
- Add 2 drops of blue food coloring. Stir/Mix together.
- Place in freezer overnight.
- Fill ice cube tray with water. Place in freezer overnight.
- Take cups and ice cube tray out of freezer.
- Remove ice from cups (you may need to place the frozen water cups in a bowl of lukewarm water for about 1 minute to ensure frozen water comes out neatly and whole, instead of in pieces).
- Fill measure cup with one cup of water. Place enough ice cubes to bring the water up to 2 cups.

- Get a small, empty bowl. Place upside-down inside the brownie pan.
- Place one frozen ice on top of the upside-down bowl in the brownie pan.
- Place the other frozen ice in the brownie pan.
- Pour the 2 C ice cubes/water mixture (from step 7) into the brownie pan.
- Record the start level of the water and/or the weight of the ice blocks/cubed ice.
- Check in 15-minute intervals until all ice has melted.
- Record observations (how the ice blocks/cubed ice looks).
- Chart results (the rise in water level in the pan and/or the weight of the ice blocks/cubed ice) at the set interval times.
- Repeat steps 1-15 three times for each temperature selected.

Results:

	Frozen Ice block in water	Regular Ice cubes in water	Frozen Ice Block on land (on top of the upside-down bowl)
Trial 1			
Trial 2			
Trial 3			
Average			

Conclusion:

Students should write what they learned and compare their results.

References:

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